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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/792,171	03/02/2004	Vladimir Aparin	020181	3700

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EXAMINER	
NGUYEN, TUAN HOANG	
ART UNIT	**PAPER NUMBER**
2618	

SHORTENED STATUTORY PERIOD OF RESPONSE	NOTIFICATION DATE	DELIVERY MODE
3 MONTHS	03/22/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/792,171	APARIN ET AL.	
	Examiner	Art Unit	
	Tuan H. Nguyen	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/22/2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,15-19,21,22,26 and 27* is/are rejected.

7)☒ Claim(s) *6-14,20,23-25 and 28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response To Arguments

1. Applicant's arguments, see applicant's remarks, filed on 12/22/2006, with respect to the rejection(s) of claims 1-28 under 35 U.S.C § 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Farrow et al. (U.S PAT. 5,825,459 hereinafter "Farrow") and Smith (U.S PAT. 5,444,864).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farrow et al. (U.S PAT. 5,825,459 hereinafter "Farrow") in view of Smith (U.S PAT. 5,444,864).

Consider claim 1, Farrow teaches an integrated circuit comprising: a summer (231) operative to receive an input signal having a transmit leakage signal ($I_{e(t)}$) and to

receive an estimator signal having an estimate of the transmit leakage signal ($S_e(t) + I_e(t)$ via A/D (230) e.g., the quantity inside the brackets is an estimate of the signal $I_e(t)$ which has leaked through hybrid 207, therefore the output signal from Echo Canceller (230) is equivalent with the estimator signal), to subtract the estimator signal ($S_e(t) + I_e(t)$) from the input signal ($I_e(t)$), and to provide an output signal having the transmit leakage signal attenuated ($S_e(t)$ e.g., input to receiver (240)), wherein the transmit leakage signal corresponds to a portion of a modulated signal being transmitted in a wireless full-duplex communication system (fig. 3 col. 5 lines 13-49).

Farrow does not explicitly show that an estimator operative to receive the output signal and a reference signal having a version of the modulated signal, to estimate the transmit leakage signal in the input signal based on the output signal and the reference signal, and to provide the estimator signal having the estimate of the transmit leakage signal.

In the same field of endeavor, Smith teaches an estimator (12) operative to receive the output signal (34) and a reference signal (30) having a version of the modulated signal, to estimate the transmit leakage signal (36) in the input signal based on the output signal and the reference signal, and to provide the estimator signal having the estimate of the transmit leakage signal (col. 2 lines 41-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use, an estimator operative to receive the output signal and a reference signal having a version of the modulated signal, to estimate the transmit leakage signal in the input signal based on the output signal and the reference

signal, and to provide the estimator signal having the estimate of the transmit leakage signal, as taught by Smith, in order to estimate the leak-through signal induced by an interfering transmitter and mixed with a desired received signal to generate a leak-through cancellation signal.

Consider claim 21, Farrow teaches an apparatus in a wireless full-duplex communication system, comprising: means for subtracting an estimator signal from an input signal and providing an output signal, the input signal having a transmit leakage signal, the estimator signal having an estimate of the transmit leakage signal, and the output signal having the transmit leakage signal attenuated, wherein the transmit leakage signal corresponds to a portion of a modulated signal being transmitted (fig. 3 col. 5 lines 13-49).

Farrow does not explicitly show that estimating the transmit leakage signal in the input signal based on the output signal and a reference signal and providing the estimator signal, the reference signal having a version of the modulated signal.

In the same field of endeavor, Smith teaches estimating the transmit leakage signal in the input signal based on the output signal and a reference signal and providing the estimator signal, the reference signal having a version of the modulated signal (col. 2 lines 41-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use, estimating the transmit leakage signal in the input signal based on the output signal and a reference signal and providing the estimator

signal, the reference signal having a version of the modulated signal, as taught by Smith, in order to estimate the leak-through signal induced by an interfering transmitter and mixed with a desired received signal to generate a leak-through cancellation signal.

Consider claim 26, Farrow teaches a method of suppressing transmit leakage signal in a wireless full-duplex communication system, comprising: subtracting an estimator signal from an input signal to obtain an output signal, the input signal having a transmit leakage signal, the estimator signal having an estimate of the transmit leakage signal, and the output signal having the transmit leakage signal attenuated, wherein the transmit leakage signal is a portion of a modulated signal being transmitted (fig. 3 col. 5 lines 13-49).

Farrow does not explicitly show that estimating the transmit leakage signal in the input signal based on the output signal and a reference signal having a version of the modulated signal and providing the estimator signal having the estimate of the transmit leakage signal.

In the same field of endeavor, Smith teaches estimating the transmit leakage signal in the input signal based on the output signal and a reference signal having a version of the modulated signal and providing the estimator signal having the estimate of the transmit leakage signal (col. 2 lines 41-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use, estimating the transmit leakage signal in the input signal based on the output signal and a reference signal having a version of the

modulated signal and providing the estimator signal having the estimate of the transmit leakage signal, as taught by Smith, in order to estimate the leak-through signal induced by an interfering transmitter and mixed with a desired received signal to generate a leak-through cancellation signal.

4. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farrow in view of Smith, and further in view of Mo et al. (U.S PUB. 2004/0219884 hereinafter "Mo").

Consider claim 2, Farrow and Smith, in combination, fails to teaches a low noise amplifier (LNA) operative to amplify a receiver input signal and provide the input signal.

However, Mo teaches a low noise amplifier (LNA) operative to amplify a receiver input signal and provide the input signal (page 3 [0035]).

Therefore, it is obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disclosing of Mo into view of Farrow and Smith, in order to measure receiver mixer IQ mismatch in a transceiver.

Consider claim 3, Mo further teaches a low noise amplifier (LNA) operative to amplify the output signal and provide an amplified signal for frequency downconversion to baseband (page 3 [0036]).

Consider claim 4, Mo further teaches a mixer operative to frequency downconvert the output signal with a local oscillator (LO) signal and provide a downconverted signal (page 3 [0036]).

5. Claims 5, 15, 22, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farrow in view of Smith, and further in view of Yedid et al. (U.S PAT. 5,526,377 hereinafter "Yedid").

Consider claim 5, Farrow and Smith, in combination, fails to teaches the estimator utilizes a least mean squared (LMS) algorithm to minimize a mean square error (MSE) between the transmit leakage signal in the input signal and the estimate of the transmit leakage signal in the estimator signal.

However, Yedid teaches the estimator utilizes a least mean squared (LMS) algorithm to minimize a mean square error (MSE) between the transmit leakage signal in the input signal and the estimate of the transmit leakage signal in the estimator signal (col. 2 lines 9-23).

Therefore, it is obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disclosing of Yedid into view of Farrow and Smith, in order to reduce non-linearities in the signal processing path of noise reduction circuitry is successfully addressed by a new and improved transversal filter configuration, which is capable of effectively tracking and thereby compensating for non-linearities in system

components that manifest themselves as added noise introduced into the received signal propagation path.

Consider claim 15, Yedid further teaches the estimator is operable to derive a set of weight values based on a training burst, and to use the set of weight values to estimate the transmit leakage signal in the input signal (col. 2 lines 42-62).

Consider claim 22, Yedid further teaches transmit leakage signal in the input signal is estimated based on a least mean squared (LMS) algorithm to minimize a mean square error (MSE) between the transmit leakage signal in the input signal and the estimate of the transmit leakage signal (col. 2 lines 9-23).

Consider claim 27, Yedid further teaches transmit leakage signal in the input signal is estimated based on a least mean squared (LMS) algorithm to minimize a mean square error (MSE) between the transmit leakage signal in the input signal and the estimate of the transmit leakage signal (col. 2 lines 9-23).

6. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Farrow in view of Smith, and further in view of Shapira (U.S PAT. 6,640,111).

Consider claim 16, Farrow and Smith, in combination, fails to teaches the estimator provides at least 30 dB of rejection of the transmit leakage signal.

However, Shapira teaches the estimator provides at least 30 dB of rejection of the transmit leakage signal (col. 11 lines 41-48).

Therefore, it is obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disclosing of Shapira into view of Farrow and Smith, in order to reduce the cost of the base station while providing desired flexibility.

7. Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mo in view of Smith.

Consider claim 17, Mo teaches a wireless device in a wireless full-duplex communication system, comprising: a low noise amplifier (LNA) operative to amplify a receiver input signal (page 3 [0035]) and to provide an input signal having a transmit leakage signal, wherein the transmit leakage signal corresponds to a portion of a modulated signal being transmitted (page 5 [0057]); and a mixer operative to receive and frequency downconvert the output signal with a local oscillator (LO) signal and to provide a downconverted signal (page 3 [0036]).

Mo does not explicitly show that an adaptive filter operative to receive the input signal and a reference signal having a version of the modulated signal, to generate an estimator signal having an estimate of the transmit leakage signal based on an output signal and the reference signal, and to subtract the estimator signal from the input signal to obtain the output signal having the transmit leakage signal attenuated.

In the same field of endeavor, Smith teaches an adaptive filter operative to receive the input signal and a reference signal having a version of the modulated signal,

to generate an estimator signal having an estimate of the transmit leakage signal based on an output signal and the reference signal, and to subtract the estimator signal from the input signal to obtain the output signal having the transmit leakage signal attenuated (col. 2 lines 41-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use, an adaptive filter operative to receive the input signal and a reference signal having a version of the modulated signal, to generate an estimator signal having an estimate of the transmit leakage signal based on an output signal and the reference signal, and to subtract the estimator signal from the input signal to obtain the output signal having the transmit leakage signal attenuated, as taught by Smith, in order to estimate the leak-through signal induced by an interfering transmitter and mixed with a desired received signal to generate a leak-through cancellation signal.

Consider claim 18, Mo further teaches the wireless full-duplex communication system is a Code Division Multiple Access (CDMA) system (page 1 [0003]).

8. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mo in view of Smith, and further in view of Yedid et al. (U.S PAT. 5,526,377 hereinafter "Yedid").

Consider claim 19, Mo and Smith, in combination, fails to teaches the adaptive filter utilizes a least mean squared (LMS) algorithm to minimize a mean square error (MSE) between the transmit leakage signal in the input signal and the estimate of the transmit leakage signal in the estimator signal.

However, Yedid teaches the adaptive filter utilizes a least mean squared (LMS) algorithm to minimize a mean square error (MSE) between the transmit leakage signal in the input signal and the estimate of the transmit leakage signal in the estimator signal (col. 2 lines 9-23).

Therefore, it is obvious to one of ordinary skill in the art at the time the invention was made to incorporate the disclosing of Yedid into view of Mo and Smith, in order to reduce non-linearities in the signal processing path of noise reduction circuitry is successfully addressed by a new and improved transversal filter configuration, which is capable of effectively tracking and thereby compensating for non-linearities in system components that manifest themselves as added noise introduced into the received signal propagation path.

Allowable Subject Matter

9. Claims 6-14, 20, 23-25, and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

10. Any response to this action should be mailed to:

Mail Stop_____ (Explanation, e.g., Amendment or After-final, etc.)

Commissioner for Patents

P.O. Box 1450

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Facsimile responses should be faxed to:

(571) 273-8300

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401 Dulany Street

Alexandria, VA 22313

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan H. Nguyen whose telephone number is (571)272-8329. The examiner can normally be reached on 8:00Am - 5:00Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Maung Nay A. can be reached on (571)272-7882882. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information Consider the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan Nguyen
Examiner
Art Unit 2618

NAY MAUNG
SUPERVISORY PATENT EXAMINER